

NO_x and VOCs

Background

The air in New Jersey is affected by many naturally occurring and man-made pollutants, and air quality in the state varies significantly depending on location, time and weather conditions. Air quality is affected by both local emissions and by transported pollution, which is carried into the area by the prevailing winds. Transported pollution has a serious impact on New Jersey's air quality just as pollution from New Jersey affects areas downwind of it.

Ground-level ozone, sometimes called smog, is formed by chemical reactions in the air from automobile, industrial and other pollutants when there is bright sunshine with high temperatures. The highest ozone concentrations usually occur between 2 p.m. and 8 p.m. from May through September. Ground-level ozone can lower one's resistance to diseases such as colds and pneumonia. It can also damage lung tissue, intensify heart and lung diseases (such as asthma), and cause coughing and throat irritation. Even healthy adults doing heavy exercise or manual labor outdoors may experience the unhealthy effects of ozone. Other people that are sensitive to ozone include the very young and those with pre-existing breathing problems. When ozone reaches unhealthy levels, children and people with asthma are most at risk.¹ (See chapter on ozone elsewhere in this Environmental Trends series.)

The primary pollutants that result in ozone formation are volatile organic compounds (VOCs) and oxides of nitrogen (NO_x). VOCs are substances that contain carbon and evaporate easily. They are present in exhaust fumes, cigarette smoke, synthetic materials and household chemicals, and include benzene, formaldehyde, some polynuclear aromatic hydrocarbons (PAH) and other compounds.² NO_x is the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. Many of the nitrogen oxides are colorless and odorless. However, one of them, nitrogen dioxide (NO₂), intermixed with particles in the air, often can be seen as a reddish-brown layer over many urban areas. Some nitrogen oxides form naturally, but their primary source in the New Jersey area is the burning of fuel at high temperatures, as in an industrial boiler or internal combustion engine. The primary manmade sources of NO_x are motor vehicles, electric utilities, and other industrial, commercial, and residential sources.³

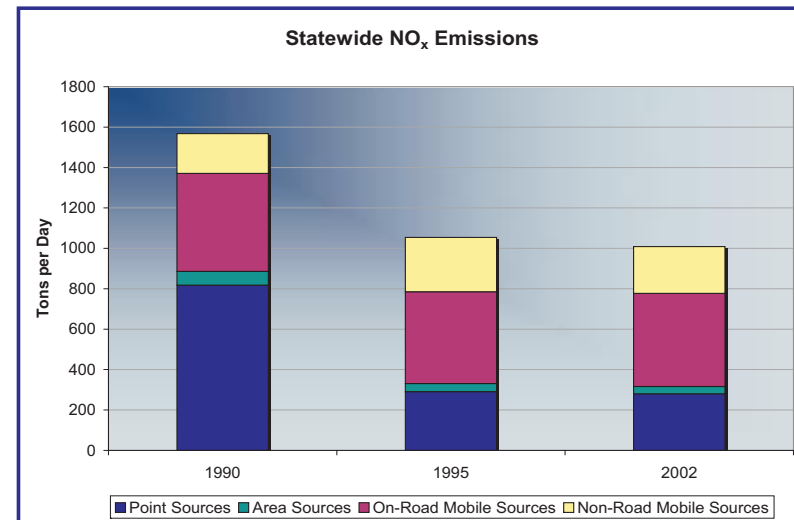
The four major source categories for these pollutants are on-road mobile sources (e.g., cars, trucks and buses), non-road mobile sources (e.g., industrial and farm equipment, trains, and lawn power equipment), point sources (e.g., manufacturing and power industries) and area sources (e.g., paints, consumer products and very small industrial sources).

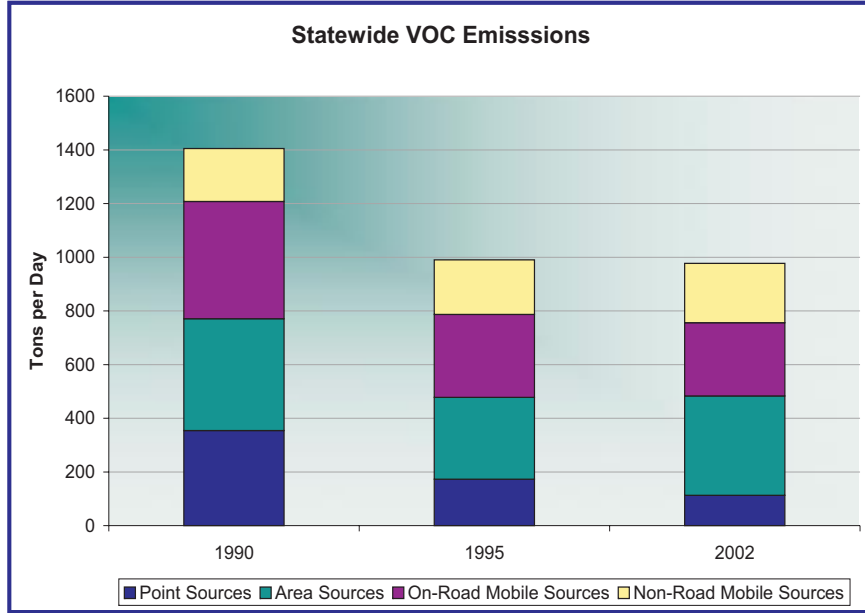
Trends

In 1996, the single largest category of ozone precursor emissions was on-road mobile sources, representing approximately 30 percent of the VOC emissions and approximately 44 percent of the NO_x emissions in New Jersey. From 1990 to 1996, the emission levels from all four source categories combined were estimated to have dropped approximately 30 percent for both VOC and NO_x emissions.

From 1996 to 2002, there was a slight decrease, overall, in NO_x emissions, with slight decreases in point, area, and non-road sources, and a slight increase in on-road sources (See "Statewide NO_x Emissions" below).

From 1996 to 2002, there was a slight decrease, overall, in VOC emissions, with decreases in point and on-road sources, and increases in area and non-road sources (See "Statewide VOC Emissions" below).





More Information

<http://www.nj.gov/dep/airmon/index.html>
<http://www.nj.gov/dep/airmon/airtoxics/sourceso.htm>
<http://www.epa.gov/air/urbanair/nox/what.html>
<http://www.nj.gov/dep/airmon/ozact.htm>

References

- ¹ <http://www.nj.gov/dep/airmon/ozact.htm>
- ² http://www.essc.psu.edu/~lampsey/geog_507/node7.html
- ³ <http://www.epa.gov/air/urbanair/nox/what.html>

Outlook and Implications

DEP has recently adopted several regulations to reduce emissions, including those coming from the common activities of many New Jersey residents. For example, beginning in January of 2005, all gasoline storage containers sold in New Jersey will be designed to minimize air pollutants. New regulations will require that certain consumer products like hair sprays, deodorants, and air fresheners be reformulated to minimize those ingredients that lead to ozone formation. DEP also began requiring the sale of low-polluting paints, varnishes and other coatings in New Jersey to continue a downward trend in VOC emissions. Requirements for lower sulfur levels in the fuels used in cars and trucks will become effective in 2006 and 2007 and lead to lower sulfate and particulate levels. These actions will help to lower emissions of pollutants that lead to poor air quality throughout the State, especially during the summer months when high ozone levels cause unhealthy air quality.